DOCUMENT RESUME

ED 344 747 SE 052 537

AUTHOR Turner, Jeannine
TITLE Improving Mathematics and Science Teaching: 1990-91 ESEA Title II Evaluation Report.
INSTITUTION Austin Independent School District, Tex. Office of Research and Evaluation.
REPORT NO AISD-Pub-90-46
PUB DATE Jun 91
NOTE 39p.
PUB TYPE Reports - Evaluative/Feasibility (142)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS Elementary Secondary Education; Inservice Teacher Education; *Instructional Improvement; *Mathematics Education; Preschool Education; *Program Descriptions; *Science Education; *Teacher Education Programs; Teacher Improvement; *Teacher Workshops
IDENTIFIERS *Austin Independent School District TX

ABSTRACT

The Elementary and Secondary Education Act (ESEA) Title II was a 12-month project for the improvement of mathematics and science teaching in grades pre-kindergarten through 12 for the Austin Independent School District comprising approximately 2,400 elementary and secondary mathematics and science teachers. This document includes: (1) an executive summary and an evaluation summary of the project; (2) evaluations by both the participants and the facilitators of the staff development workshops which acquainted teachers with the latest improvements in instructional techniques and materials in elementary and secondary mathematics and science; (3) the evaluation of the secondary mathematics graduate course by the participants; (4) an evaluation summary of the instructional materials; (5) an evaluation of the professional meetings for mathematics and science teachers; (6) an evaluation of the scope and sequence writing for secondary science teachers with examples; and (7) descriptions of project activities summarized for elementary mathematics, elementary science, elementary gifted and talented, secondary mathematics, and secondary science. (JJK)

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Improving Mathematics and Science Teaching:
1990-91 ESEA Title II Evaluation Report

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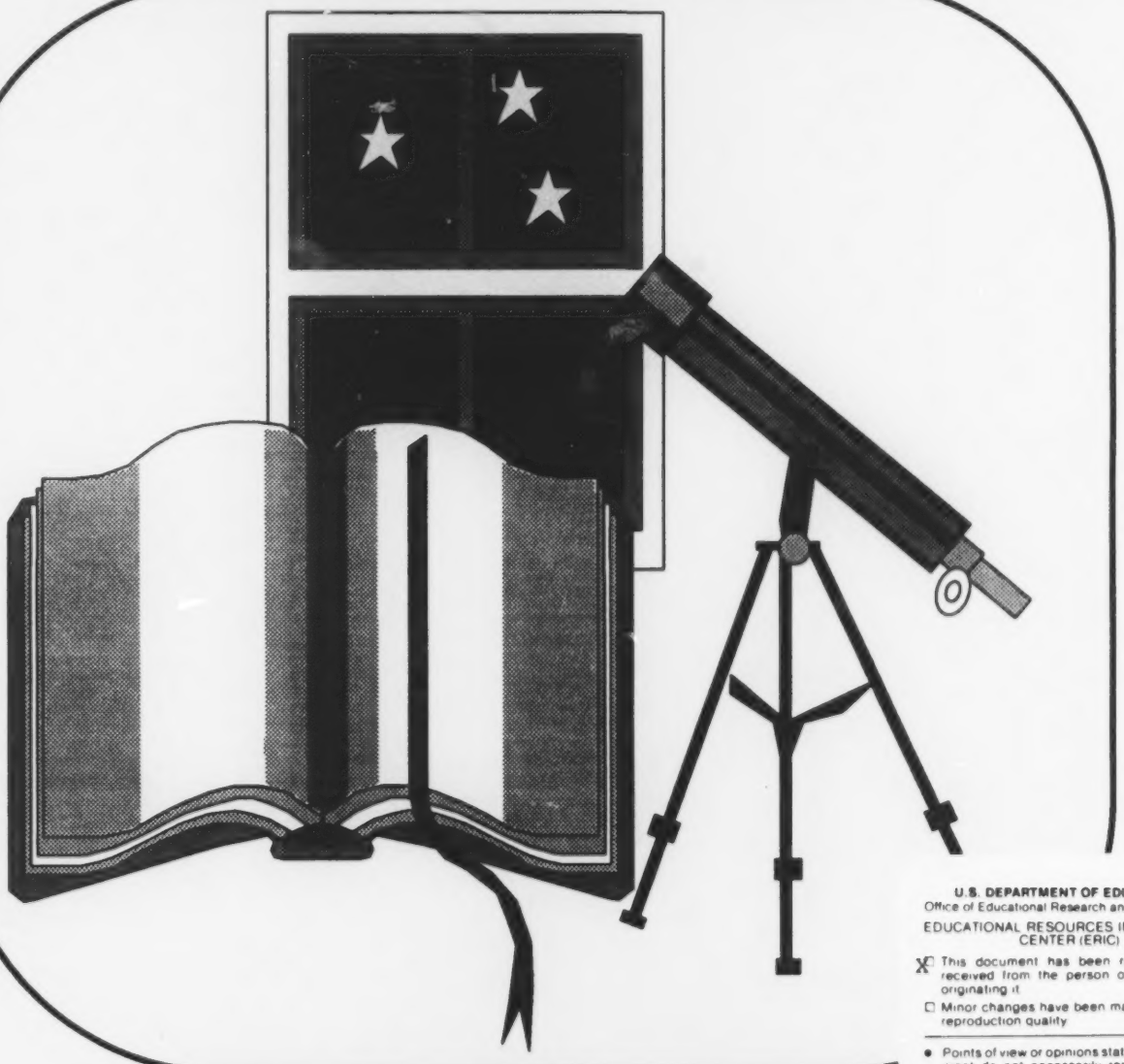

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IMPROVING MATHEMATICS AND SCIENCE TEACHING: 1990-91 ESEA Title II Evaluation Report

Author: Jeannine Turner

Program Description

Elementary and Secondary Education Act (ESEA) Title II funds were used in a 12-month project for the improvement of mathematics and science teaching in grades pre-K through 12. ESEA was designed to serve all 2,422 elementary and secondary mathematics and science teachers in the Austin Independent School District. In 1990-91, AISD received $93,737. The project provided:

- Staff development workshops,
- Funds for teachers to attend professional meetings,
- Development of scopes and sequences for science,
- Curriculum developement for a first-grade gifted and talented pilot program focusing on engineering and science,
- Materials, and
- Tuition/stipends for teachers to attend development courses.

Major Findings

1. Generally, most teachers rated the staff development workshops very positively (p. 4).
2. Secondary mathematics teachers attending a graduate course rated the experience highly (p. 17).
3. Elementary and secondary teachers gave instructional materials high ratings (p. 19).
4. Teachers who attended professional meetings rated them favorably (p. 25).
5. The pilot program for first-grade gifted and talented students received positive reviews (p. 22).

TABLE OF CONTENTS

EXECUTIVE SUMMARY i

CONCLUSION iii

INTRODUCTION 1

EVALUATION SUMMARY 3

WORKSHOP EVALUATIONS 4

- Elementary Mathematics 4
- Elementary Science 9
- Secondary Mathematics 12
- Secondary Science 14

SECONDARY MATHEMATICS GRADUATE COURSE EVALUATION 17

MATERIALS EVALUATIONS 19

- Elementary and Secondary Mathematics 19
- Elementary and Secondary Science 21
- Elementary Gifted and Talented. 22

PROFESSIONAL MEETINGS 25

SCOPE AND SEQUENCE/CURRICULUM WRITING. 27

DESCRIPTION OF PROJECT ACTIVITIES 30

- ELEMENTARY
  - Mathematics 30
  - Science 30
  - Gifted and Talented 31
- SECONDARY
  - Mathematics 32
  - Science 33

CONCLUSION

Overall, Title II funds were used effectively to improve mathematics and science teaching. The workshops, elementary and secondary, were very well received by the participants. All of the professional meetings were given high ratings. A graduate course attended by selected secondary mathematics teachers received positive reviews. A pilot program for first-grade gifted and talented students received high ratings. In addition, teachers appraised elementary and secondary mathematics and secondary science materials as useful and effective for improving instruction.

Furthermore, scopes and sequences were developed for selected secondary science courses and a pilot program was developed for gifted and talented students attending kindergarten. At present, an evaluation of the scopes and sequences or the kindergarten pilot program cannot be determined because they will not be instituted until September, 1991.

INTRODUCTION

ESEA Title II was a 12-month project for the improvement of mathematics and science teaching in grades pre-K through 12. The project was designed to serve all elementary (grades pre-K-5) and secondary (grades 6-12) mathematics and science teachers. In the 1990-91 school year AISD employed 1,835 elementary teachers, 334 secondary mathematics teachers, and 253 secondary science teachers. From July, 1990 through June, 1991, $93,737 from Title II provided:

- Staff development workshops to acquaint teachers with the latest developments in instructional techniques and materials in their field,
- Consultants to develop secondary science scopes and sequences to establish a formalized curriculum for science throughout the District,
- Funds for teachers to attend professional meetings to provide for teacher involvement within their profession,
- Materials to accompany training in new methods of instruction,
- Tuition/stipends for mathematics teachers to attend a graduate development course, and
- Funds to evaluate a pilot program for gifted and talented students in the first grade.

Figure 1 displays the elements of the 1990-91 Title II project by component. Project activities are described in detail in a later section of this report, "Description of Project Activities."

FIGURE 1
ELEMENTS OF ESEA TITLE II
1990-91

ESEA TITLE II COMPONENTS	Staff Development Workshops	Scope & Sequence Curriculum Writing	Attendance at Professional Meetings	Materials	Tuition/Stipends
Elementary Mathematics	X			X	X
Elementary Science	X		X	X	X
Elementary Gifted & Talented		X		X	X
Secondary Mathematics	X	X	X	X	X
Secondary Science	X	X	X	X	X

EVALUATION SUMMARY

The ESEA Title II evaluation focused on collecting, analyzing, and reporting information about the following.

A. Staff development workshops were offered to elementary and secondary mathematics and science teachers. Data were collected through:

   1. Interviews with AISD instructional coordinators, and

   2. Questionnaires distributed to teachers following every workshop.

B. Professional meetings were attended by selected elementary mathematics teachers and secondary mathematics and science teachers. Following the meetings, participants received questionnaires. Data were collected from the teachers who returned evaluations.

C. New materials were received by elementary and secondary mathematics and science teachers. Evaluation questionnaires were distributed following each staff development workshop where teachers were able to participate in demonstrations of the new materials.

D. Scopes and sequences were developed for selected secondary science courses. The scopes and sequences components were collected through administrator interviews.

E. A pilot program for gifted and talented students in first grade was evaluated through teacher questionnaires. A similar pilot program was designed for kindergarten.

Because the major portion of the project activities occurred at the end of the school year, and funds for evaluation were expended by June 30, 1991, the evaluation was primarily of the process type. Very limited outcome data were available about the effectiveness of the staff curriculum development by the conclusion of the term of the funded evaluation. The ultimate impact of the efforts to improve curricula, instructional materials, and teacher training in science and mathematics can only be ascertained over the long term, and then indirectly through the examination of global indicators of student achievement, which are influenced by a myriad of other factors.

WORKSHOP EVALUATIONS

Generally, all of the elementary and secondary mathematics and science workshops were given high ratings by the participants. Most comments from the teachers were positive also.

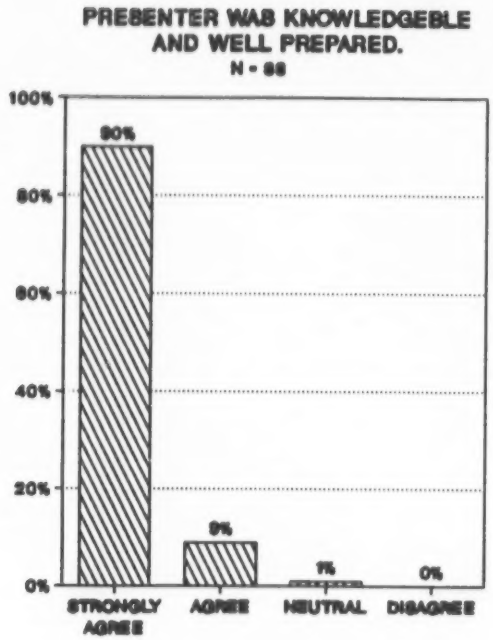
Elementary Mathematics

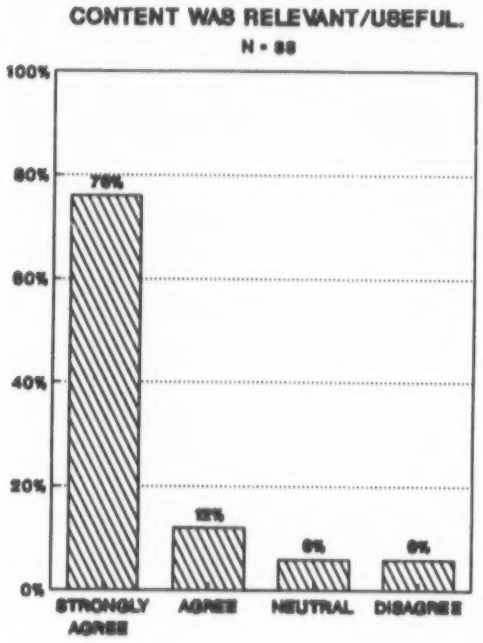
Elementary teachers and administrators were offered one fall workshop and one spring workshop. The fall workshop, held on November 24, 1990, concentrated on training teachers in the use of Geoboards. Different evaluation questionnaires were used for this workshop because it was hosted in the fall. The spring workshop concentrated on the use of simple calculators.

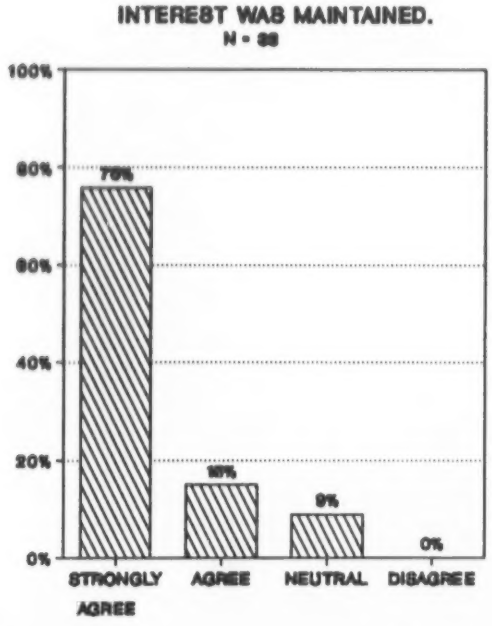
The Geoboards workshop, held on November 24, 1990, had 33 participants; 16 administrators, 12 teachers, and 5 teaching aides. **Overall, the responses were quite positive.** Of the 33 returned questionnaires, respondents strongly agreed or agreed that:

- Interest was maintained (91%),
- Content was relevant/useful (88%), and
- Presenters were knowledgeable and well prepared (97%) (see Figure 2).

FIGURE 2
ELEMENTARY MATHEMATICS
WORKSHOP EVALUATION
1990-91







Title II provided one spring elementary mathematics workshop held on April 11, 1991. This workshop was attended by 28 participants; all returned questionnaires. Out of the total participants, 15 (54%) were elementary administrators, 10 (38%) were elementary teachers and 3 (11%) were listed as "other." The "others" consisted of two aides and one librarian. The workshop focused on using calculators in elementary classrooms. Altogether, a total of 28 (100%) questionnaires were returned and analyzed. **Overall, the responses were quite positive**, with most respondents strongly agreeing or agreeing that:

- The staff development workshop was beneficial and helpful (100%),
- Receiving this training would make them better teachers of mathematics and/or science (96%),
- Overall, the training was worthwhile (100%). (see Figures 3 and 4).

FIGURE 3
ELEMENTARY MATHEMATICS
WORKSHOP EVALUATION
1990-91

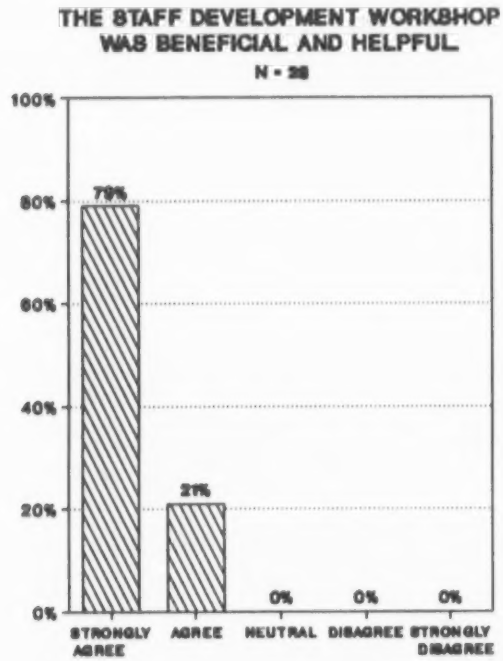
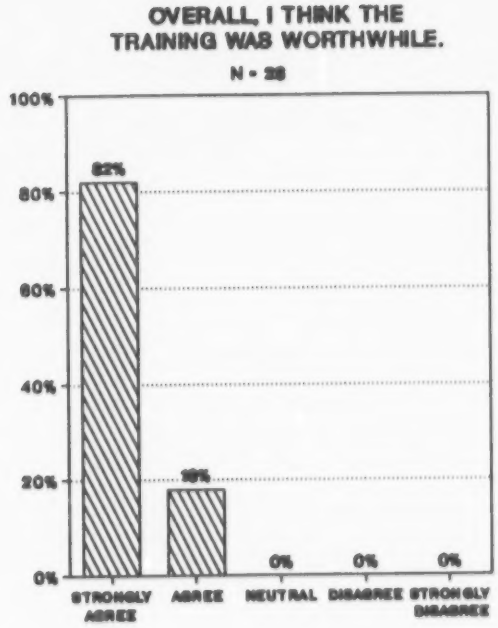
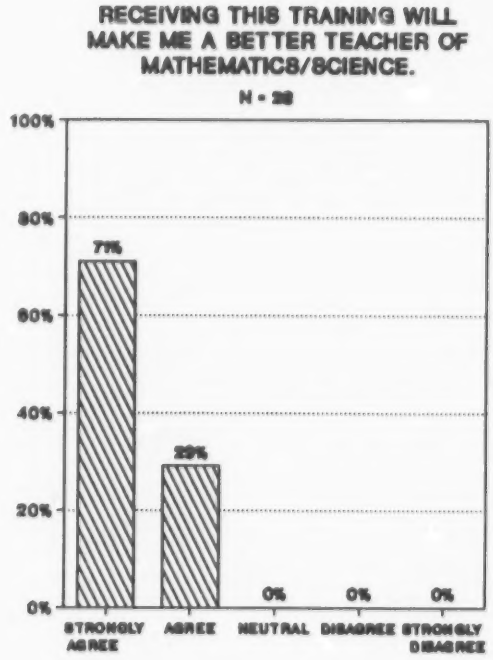


FIGURE 4
ELEMENTARY MATHEMATICS
WORKSHOP EVALUATION
1990-91





Responding to the question "What did you like most about the training?" participants commented:

- Fun activities with calculators. They all kept my attention.
- I enjoyed the exposure to all the different possibilities of calculator usage.
- The relation of basic math concepts to algebra and higher level math processes was very helpful.

Answering the question, "Will this training change your instructional methods, If so, how?" participants responded:

- Yes! Children who achieve math concepts with difficulty will benefit tremendously with the use of the calculator.
- Yes, creative ideas and hands on for slow-learners; all can get higher-level thoughts.
- Greater emphasis will be placed on thinking skills associated with calculators instead of simple calculations.

Participants offered the following comments to the question, "How will this training improve student achievement?":

- Calculator use is a life skill long overdue in elementary classrooms. Problem-solving abilities will improve.
- It will develop better students' analysis and evaluation skills which will enhance their thinking and academic skills.
- Will validate problem solving rather than computational skills.

Elementary Science

An elementary science workshop was held on June 4, 1991. A total of 75 teachers attended, and 66 (86%) teachers turned in completed questionnaires. Of the teachers who returned questionnaires, 57 (86%) were elementary teachers and the remaining 9 teachers (14%) were junior high or middle school teachers. **Generally, teachers rated the workshop favorably, and almost all comments were positive.** Negative comments focused attention on the crowded facilities of the workshop site. Elementary science teachers strongly agreed or agreed that:

- The staff development workshop was beneficial and helpful (98%),
- Receiving this training would make them better teachers of mathematics and/or science (93%), and
- Overall, the training was worthwhile (99%) (see Figures 5 and 6).

FIGURE 5
ELEMENTARY SCIENCE
WORKSHOP EVALUATIONS
1990-91

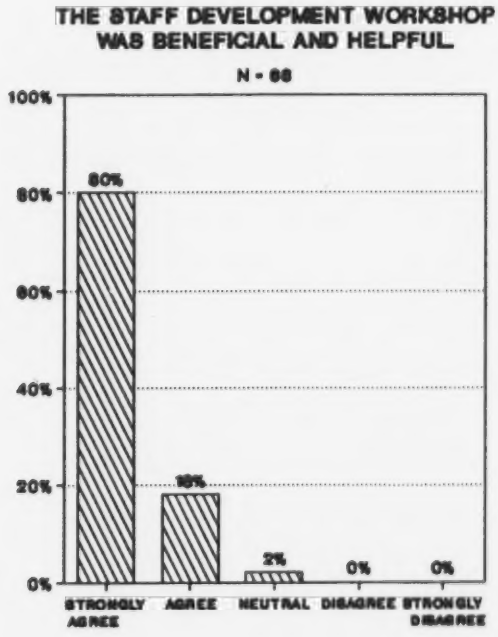
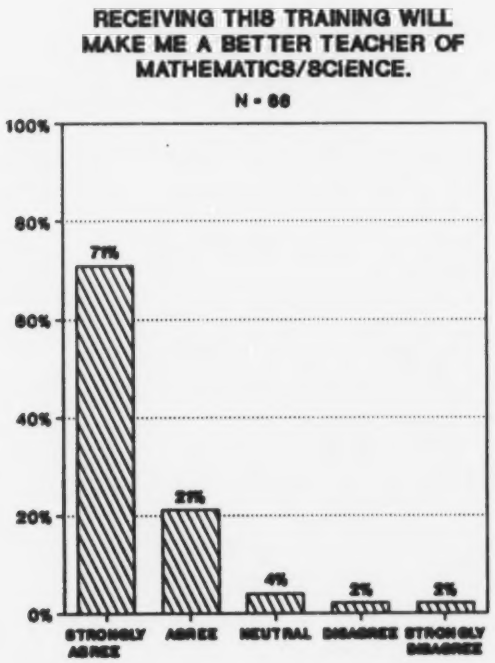
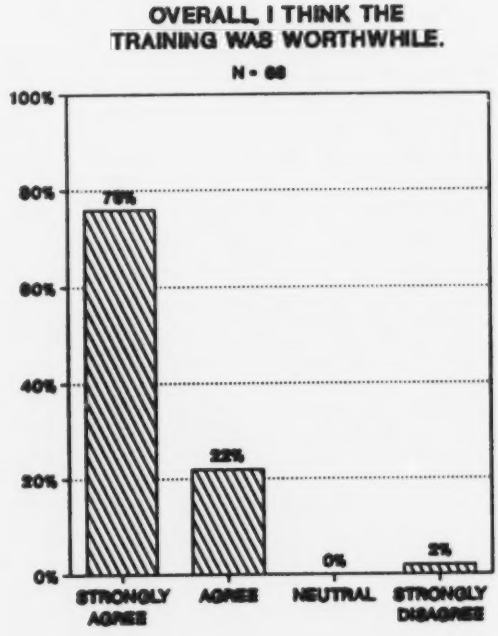


FIGURE 6
ELEMENTARY SCIENCE
WORKSHOP EVALUATIONS
1990-91





The comments from the questionnaires were mainly positive. In their comments, teachers showed enthusiasm for the exposure to new instructional methods and ideas. Responding to the question, "What did you like most about the training?" teachers from the "Science and Technology" workshop commented:

- I enjoyed the "hands-on" experience with the laser disc material.

- The fact that we were taken through the materials step by step.
- The presenters were articulate, intelligent, and interesting.
- I enjoyed the science lessons which make it "fun" for the students.

Participants responding to the question, "Will this training change your instructional methods? If so, how?" commented:

- Yes! It will give me a lot of resources I didn't have before.
- Visual and hands on really get the point across and kids love it!
- Yes! I will be using the laser disc and more visual teaching.
- Yes. I am trained to integrate two new materials to the science program (laser discs and new books).

The workshop was successful, according to the Elementary Science Instructional Coordinator. Although she was pleased that so many teachers participated, the workshop was quite crowded because 10 teachers showed up unexpectedly without previously signing up. She realized a great deal of material was covered in one day and has offered an optional attendance follow-up session to allow teachers more experience with using the laser disc. Most of the workshop participants have expressed a desire to attend.

Secondary Mathematics

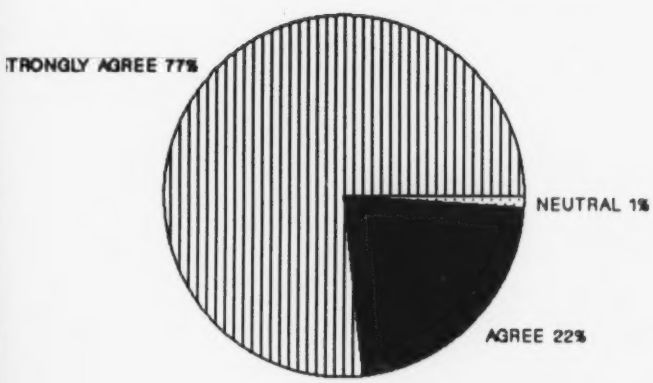
Secondary mathematics teachers were offered five workshops at the end of the school year. A total of 86 teachers attended the workshops, and 84 (98%) turned in completed questionnaires. Among the respondents, 47 (56%) were middle school or junior high school teachers and 37 (44%) were high school teachers. **All participants rated the workshops positively.** Very few negative comments were received. Most of the negative comments expressed a desire to have more time to work with materials. Teachers strongly agreed and agreed that:

- The workshop was well organized (98%),
- The leader of the workshop was informed and insightful (100%), and
- The objectives of the workshop were clear (99%).

Figure 7 displays results from other questions.

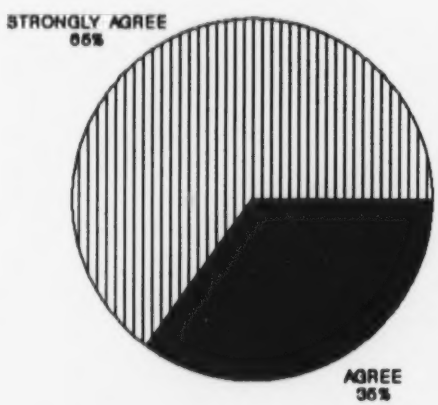
FIGURE 7
SECONDARY MATHEMATICS
WORKSHOP EVALUATIONS
1990-91

N = 84



THE STAFF DEVELOPMENT WORKSHOP WAS BENEFICIAL AND HELPFUL.

N = 84



RECEIVING THIS TRAINING WILL MAKE ME A BETTER TEACHER OF MATHEMATICS/SCIENCE.

Comments were positive in all workshops. Some teachers in the "Using the TI-34 Scientific Calculator In the Classroom" workshop responding to the question, "What did you like most about the training?" commented:

- I enjoyed actually getting to do the procedures on the calculator.
- The hands-on calculator use and worksheets were very beneficial.
- Instruction was thorough and there was time to practice.
- Collaborating with other teachers about their ideas.

Responding to the question, "How will this training improve students' achievement?" teachers from the "Using the Graphics Calculator in the Mathematics Classroom" workshop commented:

- It will allow students to see more graphs and how changes in the equation will affect the graphs.
- It will enable us to do many things much quicker!
- They will have high interest and motivation.
- They will gain experience relating technology to their math concepts.

The Secondary Mathematics Instructional Coordinator believes that the workshops were successful. He stated that the workshops exposed teachers to the latest technology and teaching techniques, which was the main objective. Many of the teachers expressed a desire for more in-depth knowledge. His only lament was that he wished more teachers had attended, especially because the workshops were so well received.

Secondary Science

Secondary Science offered a laser disc technology workshop in combination with an inservice meeting to develop scopes and sequences for seventh-grade life science and ninth-grade biology courses. The purpose of the inservice was to infuse laser disc technology images into curriculum and to bridge the curriculum from middle school to high school. A total of 31 teachers and one administrator attended the workshop. Altogether, 25 (81%) questionnaires were returned and analyzed. Of the teachers who returned questionnaires, 12 (48%) were junior high or middle school teachers and 12 (48%) were senior high school teachers. One administrator was present. **Teachers responded positively.** Middle and high school teachers strongly agreed or agreed that:

- The staff development workshop was beneficial and helpful (96%),
- Receiving this training would make them better teachers of mathematics and/or science (96%), and
- Overall, the training was worthwhile (96%) (see Figures 8 and 9)

FIGURE 8
SECONDARY SCIENCE
WORKSHOP EVALUATION
1990-91

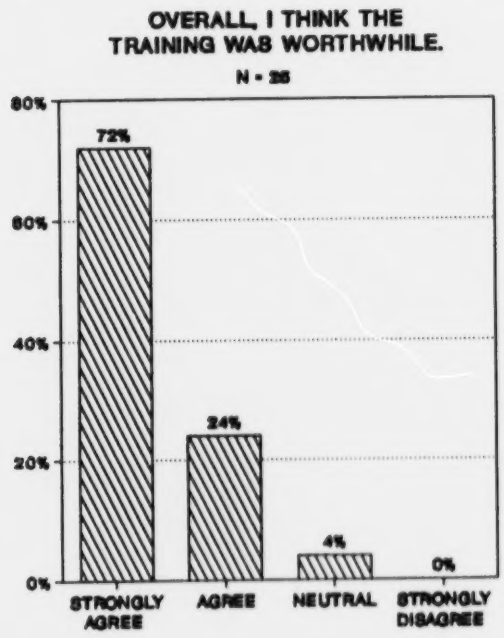
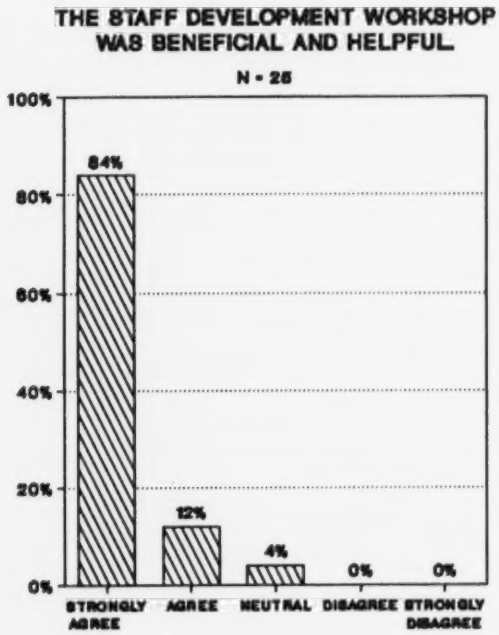
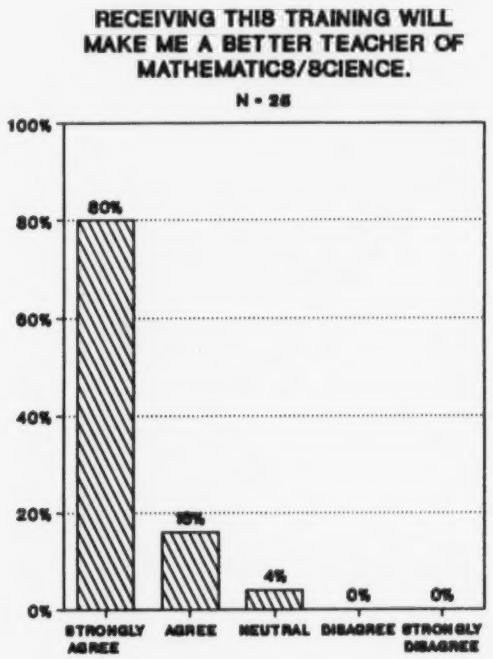


FIGURE 9
SECONDARY SCIENCE
WORKSHOP EVALUATION
1990-91





Comments from the teachers were mostly positive. Teachers responded enthusiastically to the laser disc technology. On the negative side, the majority of teacher complaints centered on the feeling that more time was needed to complete their task and to work with materials. Answering the question, "How will this improve student achievement?" participants replied:

- The curriculum will now do a better job of meeting the needs of students; it will be better coordinated between grade levels.

- Students will get more foundation, more depth, and less fluff!

- Each course will build upon another. Students will be able to experience continuity and experience more successful transfer of information.

- This training will increase students' interest and motivation.

Teachers responding to the question, "What did you like most about the training?" commented:

- That I was instrumental in developing relevant curriculum.

- I enjoyed the interactions with the laser disc and the communications with high school teachers.

- I most liked the exchange of ideas and the sharing so that scope and sequence could be achieved and all can improve teaching.

- To see correlation between junior and senior high biology curriculum and a "real" curriculum guide and outline produced.

According to the Secondary Science Instructional Coordinator, the workshop was very successful. He was particularly pleased at the enthusiasm of all participants and the interaction between junior high and senior high school teachers. The laser disc training correlated visual images with the generated scope and sequence.

90.46

GRADUATE COURSE EVALUATION

All secondary mathematics graduate course participants gave the course high ratings and positive comments.

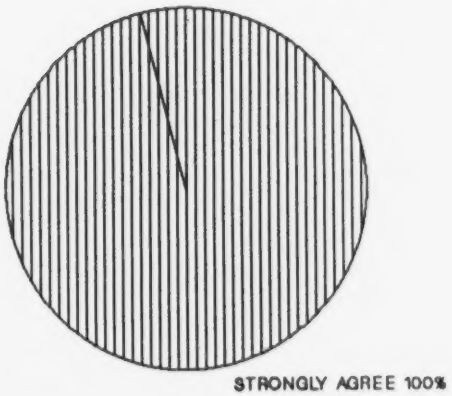
This year, for the first time, secondary mathematics teachers were offered the opportunity to participate in a graduate course offered at Southwest Texas State University. Title II funds paid for the tuition of 16 participants to attend Math 5304 which concentrated on the use of manipulatives and technology in the development of a problem-solving focus in algebra and geometry. The course was eight weeks in length and met Tuesday and Thursday evenings from October 9 - November 29, 1990. Of the 16 participants, 14 (88%) returned questionnaires; 2 (13%) were middle or junior high school teachers, and the remaining 12 (75%) were senior high school teachers. **All responses were positive.** The participants of the graduate course strongly agreed or agreed that:

- The course was beneficial and helpful (100%),
- The course was well organized (86%),
- Attending this course would make them better teachers of mathematics and/or science, and
- Overall, the couse was worthwhile (100%) (see Figure 10).

Although comments were not solicited, one teacher wrote on the questionnaire, "This was more beneficial than one-day workshops. It was valuable because it required a considerable effort from the participant. I would like to see one of these given for calculus, etc."

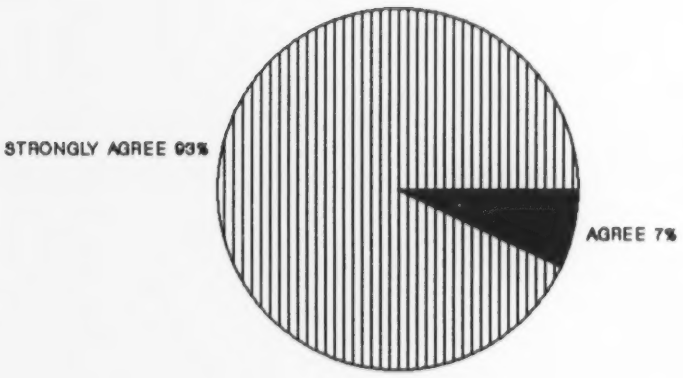
FIGURE 10
SECONDARY MATHEMATICS
GRADUATE COURSE EVALUATIONS
1990-91

N = 16



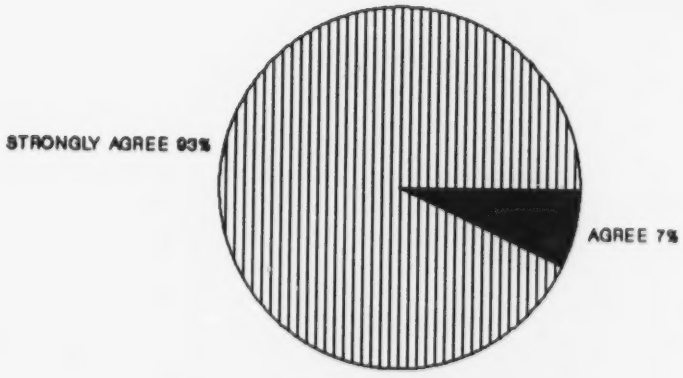
THE GRADUATE COURSE WAS BENEFICIAL AND HELPFUL.

N = 16



ATTENDING THIS COURSE WILL MAKE ME A BETTER TEACHER OF MATHEMATICS/SCIENCE BECAUSE I AM NOW MORE INFORMED OF THE CURRENT ADVANCEMENTS IN THE FIELD.

N = 16



OVERALL, I THINK THIS COURSE WAS WORTHWHILE.

MATERIALS EVALUATIONS

Almost all teachers rated new materials highly and gave optimistic responses for their future use.

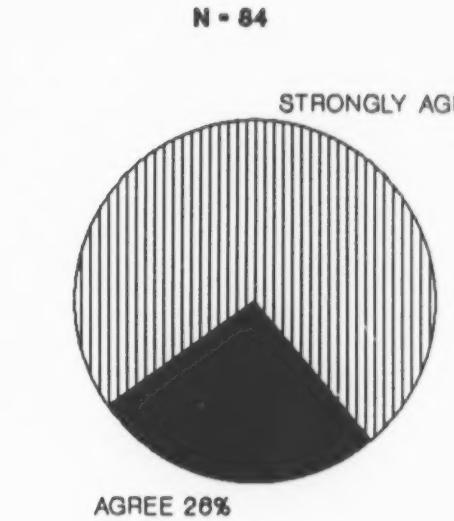
Elementary and Secondary Mathematics

Secondary Mathematics purchased new instructional materials with Title II funds. Many of the workshops trained teachers to use the materials in the classroom, and the only exposure that teachers had to them prior to the evaluation was through the workshops. The questionnaires that teachers completed following each staff development workshop included questions about the materials presented. All of the opinions examined in elementary and secondary mathematics were formed with minimal exposure to the instructional materials and without using them in the classroom.

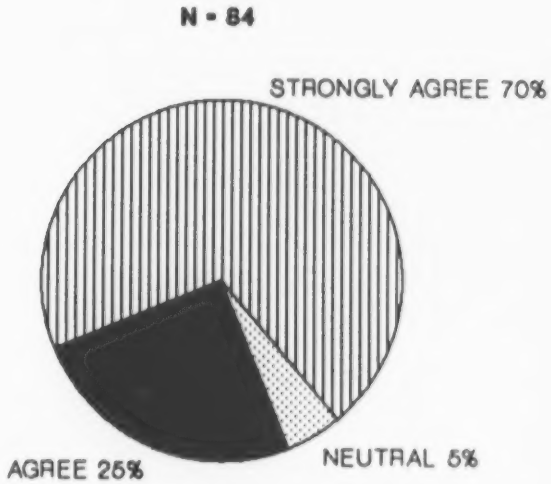
A total of 86 secondary mathematics teachers attended workshops which used the ORE-developed questionnaires that asked participants about the materials presented. Altogether, 84 (98%) completed questionnaires. **Almost all teachers were very satisfied with the materials.** Most teachers strongly agreed or agreed that:

- The materials presented were compatible with the training given (100%), and
- The materials were effective in improving mathematics/science instruction (96%) (see Figure 11).

FIGURE 11
ELEMENTARY AND SECONDARY MATHEMATICS
MATERIALS EVALUATIONS
1990-91



THE MATERIALS PRESENTED WERE COMPATIBLE WITH THE TRAINING GIVEN.



THE MATERIALS WERE EFFECTIVE IN IMPROVING MATHEMATICS/SCIENCE INSTRUCTION.

Commenting on the materials, secondary teachers participating in the "Using the Calculator in Middle School" workshop responded:

- Using calculators will allow students to do things--specifically computations--quicker and thus allow more work on "concepts."
- Teaching with the calculators will help students better prepare for real-life situations involving math.
- By using the calculators, students will be able to understand more functions and cover more advanced material.

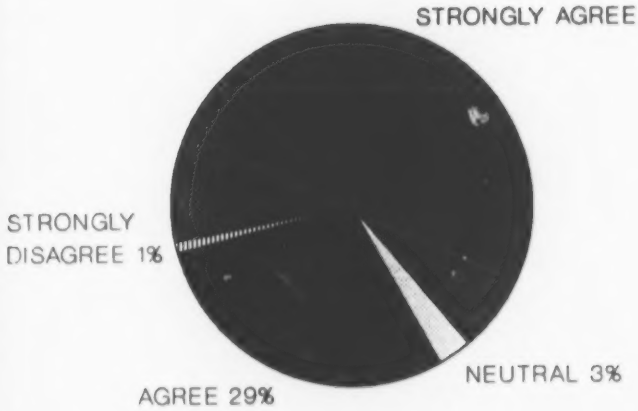
Elementary and Secondary Science

Elementary Science purchased three "Voyage of the Mimi" video kits and three Apple 2E computers by which to use the kits. Surveys were distributed at the laser disc workshop which included questions about the materials. Altogether 99 teachers participated in the elementary and secondary workshops; 91 (92%) questionnaires were returned and analyzed. Of the 91 respondents, 57 (63%) were elementary teachers, 21 (23%) were junior high or middle school teachers, and 12 (13%) were senior high school teachers. One administrator attended a workshop. **Overall, the participants rated the materials positively.** The teachers strongly agreed and agreed that:

- The materials presented were compatible with the training given (96%), and
- The materials were effective in improving mathematics/science instruction (95%) (see Figure 12).

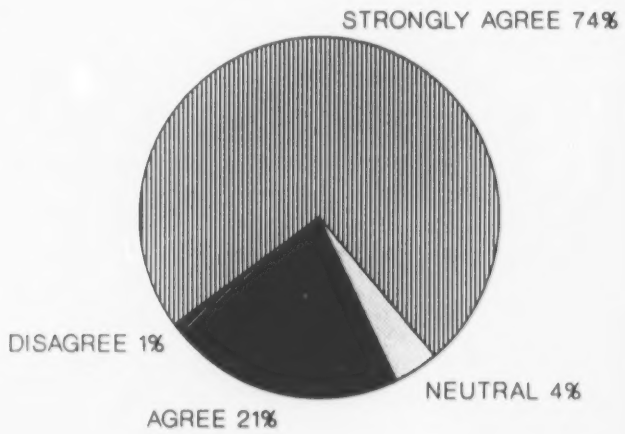
FIGURE 12
ELEMENTARY AND SECONDARY SCIENCE
MATERIALS EVALUATIONS
1990-91

N = 91



THE MATERIALS PRESENTED WERE COMPATIBLE WITH THE TRAINING GIVEN.

N = 91



THE MATERIALS WERE EFFECTIVE IN IMPROVING MATHEMATICS/SCIENCE INSTRUCTION.

Comments related to the materials were very positive. Most teachers believe that the laser disc technology will facilitate understanding, especially for visual learners. Teachers commented on the laser discs as follows:

- Visual learners will do much better; children can experience things they never had a chance to see.
- With laser disc technology, students will receive multi-modality learning.
- With this technology, students will, I believe, really get more excited about science and will retain more information and get the big picture of what science is all about.

Elementary Gifted and Talented

Elementary Gifted and Talented teachers were awarded a total of $1,399.54 in instructional materials. The materials were science teaching aids for their classrooms and were awarded as an incentive for leading an after-school science club beyond normal work hours. The science teaching aids were received the last week of school, and their effectiveness will not be evaluated until next year. Science club activities and participation are discussed further in the "Description of Project Activities" section of this report.

A first-grade pilot program for gifted and talented students was used at one elementary school. The program plan was titled "Design Technology" and consisted of lesson plans involving engineering for children. A Design Technology Kit was purchased for use in conjunction with the lesson plans. The kit consisted of tools and materials for building structures, wheels, axles, etc. Four teachers piloted the program and returned evaluation questionnaires. **All teachers rated the program and materials very positively.** The teachers strongly agreed that:

- The Design Technology activities included teaching strategies which were effective in their classroom (100%),
- They have a need for teaching materials such as this which encourage creativity in science (100%), and
- Design technology curriculum could make their students more aware of careers in science and engineering (100%).

Elementary Gifted and Talented teachers were offered eight different mathematics computer-game programs available for check-out on a monthly basis. Each program focused on a different

mathematics aspect and contained different degrees of difficulty. Teachers were asked to respond to questionnaires after they had used a program. See Figure 13 for a description of the mathematics computer programs. All questions on the survey were open-ended. **Responses were very positive.** One teacher responding to the question, "Would you buy this program for your class? Why or Why Not?" offered the following comment concerning the "Solve It!" computer program:

- Yes. The program is clear and well written. It held the interest of my students and offered a number of problems at each level, all of which have variables, so they are different each time you play. The levels provide clear progression of skills taught. It gave good use of hints and positive and constructive feedback. There were not many graphics, but the few it had were interesting. Also, the accompanying manual was well written and had good activities for use in the classroom and worksheets for use with the program.

Another teacher, after using the "How the West Was One + Three x Four" program, offered the following suggestions for use of this program:

- This program works well with groups because of the need for seeing several possible solutions and choosing only one. After use in a group it could be used in a lab setting, two students per computer.

FIGURE 13
MATH COMPUTER PROGRAMS AVAILABLE TO GIFTED AND TALENTED TEACHERS
1990-91

BALANCING BEAR
This program provides a visual introduction to addition and inequalities. There are four levels of difficulty and multiple solutions are possible. Many problems on level four have no solution at all.

SUBTRACTION WITH BALANCING BEAR
Students discover different subtraction strategies as they remove and combine numbers to achieve one or more correct answers. They must also recognize when a problem has no solution.

MULTIPLY WITH BALANCING BEAR
Students learn about number relationships in multiplication.

THE ENCHANTED FOREST
Students must use attributes to identity shapes and sort the shapes into conjunctions, disjunctions, and negations.

HOW THE WEST WAS ONE + THREE X FOUR
This exciting mathematics strategy game teaches order of operations and the importance of using parentheses. Students expand their problem-solving strategies as they strive to beat their opponent--either another student or the computer.

TAKING CHANCES
Explores the principles of probability with a highly challenging program. Students learn how sampling with replacement produces different results from sampling without replacement.

SOLVE IT!
This program uses a game format in which students play the role of a detective using a detective agency data base. The student uses exploration and discovery skills to analyze and synthesize information in order to solve the mysteries. An evaluation of the student's problem-solving abilities is given at the end of the session.

BUILDING PERSPECTIVE
This is a challenging game of spatial perception involving different perspectives of various buildings.

PROFESSIONAL MEETINGS

All conference participants responded favorably and expressed the benefits obtained from attending.

In 1990-91, 51 secondary mathematics and science staff members attended professional meetings (the total includes 47 teachers, four administrators.) Figure 14 shows the dates and locations of the conventions.

FIGURE 14
SECONDARY MATHEMATICS AND SCIENCE PROFESSIONAL MEETINGS
1990-91

MATHEMATICS

National Council of Teachers of Mathematics (NCTM)
April 17-20, 1991
New Orleans, Louisiana

SCIENCE

National Science Teachers Association (NSTA)
March 27-30, 1991
Houston, Texas

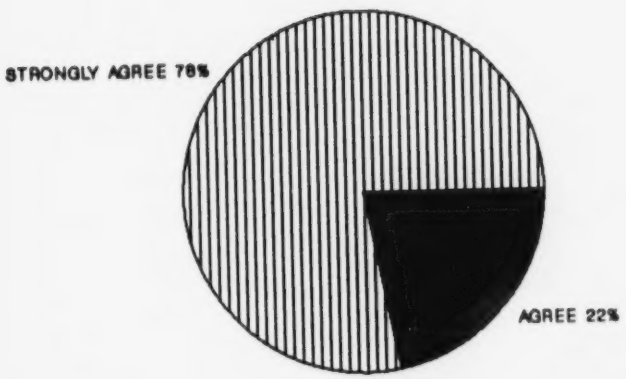
Following each meeting, the teachers completed a questionnaire to evaluate their experiences at the convention. Of the 51 convention attendants, 34 (66%) turned in a completed questionnaire. Among respondents, 27 (79%) were science teachers and 7 (19%) were mathematics teachers. Altogether, 8 (24%) were middle school or junior high school teachers, 24 (71%) were high school teachers, and 2 (6%) were administrators. **The teachers responded very favorably to the conventions.** See Figure 15.

Although comments were not solicited, several teachers included remarks on their questionnaires.

- The conference was wonderful. I received many useful materials that I shared with both students and fellow teachers!
- I was able to use demonstrations and materials immediately upon my return.
- I received a lot of useful resources for my classes.

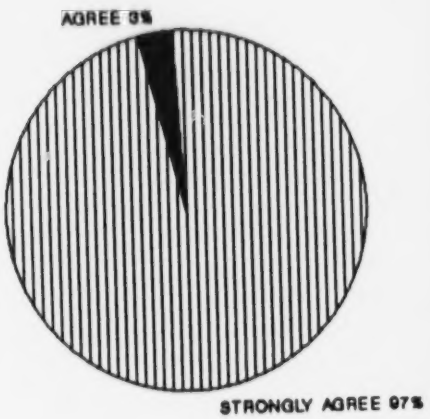
FIGURE 15
PROFESSIONAL MEETINGS
SECONDARY SCIENCE AND MATHEMATICS
1990-91

N = 34



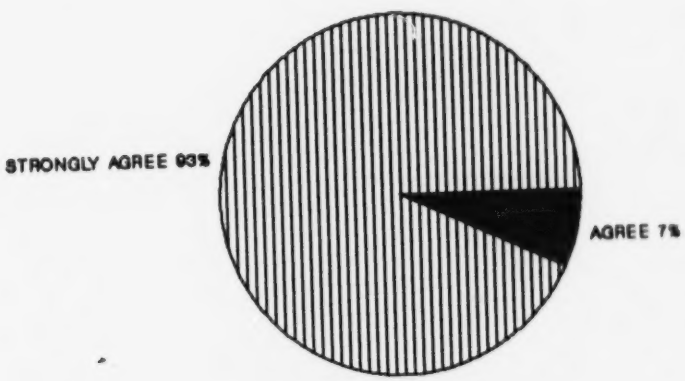
ATTENDING THIS CONFERENCE WILL MAKE ME A BETTER TEACHER OF MATHEMATICS/SCIENCE BECAUSE I AM NOW MORE INFORMED OF THE CURRENT ADVANCEMENTS IN THE FIELD.

N = 34



THE PROFESSIONAL CONFERENCE WAS BENEFICIAL AND HELPFUL.

N = 34



OVERALL, I THINK THIS CONFERENCE WAS WORTHWHILE.

Scopes and sequences were developed for 7th-grade life science and 9th-grade biology courses. Gifted and talented curriculum was developed for kindergarten and 1st-grade students focusing on engineering and science.

Secondary Science Scopes and Sequences

Secondary science scopes and sequences were developed for 7th-grade life science and 9th-grade biology. Scopes and sequences for other grades will be developed over the next four years. Because the development of the scope and sequence tasks are so complex, the scopes and sequences of two particular courses instead of all AISD science courses were developed for the secondary science curriculum. According to the Secondary Science Instructional Coordinator, a scope and sequence for a given course provides the framework for which concepts will be taught during the school year. In addition, it suggests the sequence and gives details of each concept. The scopes and sequences were developed to create a more uniform curriculum throughout the District in life science and biology, to focus on audio/visual materials, and to streamline the curriculum.

The 7th-grade life science scope and sequence was developed by 15 AISD middle school teachers over a four-day period in conjunction with a laser disc technology workshop. The Secondary Science Instructional Coordinator sent a letter to each middle school to invite one or two teachers to participate. Teachers were chosen at each respective school by their interest and merit. The teachers received a stipend for their work. Following their development of the scope and sequence, the teachers will return to their school as trainers for the other 7th-grade teachers.

The 9th-grade biology science scope and sequence was developed by 15 high school teachers over a period of four days in conjunction with the same laser disc workshop attended by the middle school teachers. The selection process was the same as with the 7th-grade teachers, based on interest and merit. The teachers received a stipend for their work. The teachers who developed the biology science scope and sequence returned to their school to train the other 9th-grade teachers.

Basic course outlines were generated in correlation with the textbooks and videodiscs. The Secondary Science Instructional Coordinator was extremely pleased with the results and felt that the week had been very productive. He further believed that the teachers who participated realized the important role they played in putting the scopes and sequences together. Figure 16 presents a sample scope and sequence for 7th-grade life science.

FIGURE 16
SECONDARY SCIENCE SCOPE AND SEQUENCE (SAMPLE)
1990-91

7th-Grade Life Science

I. Cells
   Objectives:
   The student will be able to:
   1. identify the cell as the basic unit of all living things.
   2. identify parts of cells and tell what they do.
   3. differentiate between plant and animal cells.

II. Plants
   Objectives:
   The student will be able to:
   1. identify plant parts (gross anatomy of stems, flowers, seeds/spores, roots).
   2. describe what plant parts do.
   3. explain the role of photosynthesis in the environment.
   4. explain the importance of plants economically and environmentally.
   5. explain uses of plants by man and other organisms.

III. Animals
   A. Behavior
   Objectives:
   The student will be able to:
   1. observe animal behaviors, i.e., stimulus-response, territory, social, migration, instinct.
   2. recognize the importance of beneficial and harmful organisms.

   B. Endangered Species
   Objectives:
   The student will be able to:
   1. define extinct, endangered, threatened, mutations.
   2. explain the impact of humans on wildlife.
   3. discuss ways wildlife can be protected.

IV. Ecology/Environmental Problems
   Objectives:
   The student will be able to:
   1. discuss relationships between ecology, biosphere, ecosystems, environment, habitats, populations, and communities.
   2. analyze environmental relationships, including food chains, food webs, food pyramids, producers, consumers, and decomposers.
   3. discuss the concept of cycles.

90.46

Curriculum Writing for Design Technology, Elementary Gifted and Talented Program

Title II funds were disbursed for four teachers to review the pilot lessons used in the Design Technology pilot program. During a six-hour session, the teachers reviewed and rewrote as needed the lessons for the first-grade curriculum which focused on engineering and science. Furthermore, a Kindergarten Design Technology was developed by the Elementary Gifted and Talented Science Specialist for use next year. See Figure 17 for a sample of the Kindergarten Design Technology Curriculum.

FIGURE 17
ELEMENTARY GIFTED AND TALENTED
CURRICULUM FOR DESIGN TECHNOLOGY
1990-91

Learning Experiences and Lessons:

Learning Experience One: Materials that we use
1. Natural and synthetic materials
2. Properties of natural and synthetic materials
3. Mixtures of materials and properties

Learning Experience Two: Structures and models
1. Tents and Tepees
2. Balance and Stability: Calder mobiles
3. Models of structures

Learning Experience Three: Levers
1. We use balancing: two for the see-saw
2. A card that moves with levers
3. Levers change direction of movement
4. Mechanicals I: Toys that move using levers

Learning Experience Four: Cams: Wheels that work levers
1. Wheels and Axles
2. Pop-up scenes

Learning Experience Five: Rubber band power
1. Paddleboats, Ahoy!
2. First Technology Fair

DESCRIPTION OF PROJECT ACTIVITIES

ELEMENTARY

Elementary Mathematics

Two elementary mathematics workshops offered during the 1990-91 school year concentrated on manipulatives and calculator usage. A week-long workshop is planned for the last week of June (24-28) which will concentrate on "Making Math Memorable." Because of time constraints, the evaluation results of that workshop cannot be included in this report.

The workshops were organized by the AISD instructional coordinator responsible for the elementary mathematics curriculum. The workshops were sponsored in connection with Region XIII, the educational service center for Austin area schools. The workshops are being held in AISD schools.

The leader of the elementary mathematics staff development workshop was a consultant from Region XIII.

Questionnaires were used for the workshop evaluations. Two different forms were utilized, an evaluation from Staff Development that is generally used following all workshops and an evaluation developed by ORE specifically for the mathematics and science workshops. The Staff Development evaluation form was used in the first elementary mathematics workshop. The two questionnaires are similar in their questioning format; however, the ORE evaluation included more open-ended questions that solicited comments.

Elementary Mathematics purchased 95 simple calculators and 70 geoboards with Title II funds.

Elementary Science

The elementary science staff development workshop concentrated on teaching laser disc technology and integrating life science, physical science, and earth science.

The workshop was organized by the AISD instructional coordinator responsible for the elementary science curriculum. The workshop was one day in length. It was held at the Hyatt Regency Hotel on June 5, 1991. The leader of the workshop was a science consultant from Optical Data Corporation, the producers of the laser discs and Windows on Science, the coordinating textbook.

Elementary Science spent $6,670 in Title II funds for new instructional materials which consisted of three "Voyage of the Mimi kits, three apple 2E computers, and laser discs.

Two elementary science administrators and five teachers attended a national convention, the annual meeting of the National Science Teachers Association (NSTA). The convention was held April 17-20, 1991, in New Orleans, Louisiana.

Elementary Gifted and Talented

The elementary gifted and talented program used Title II funds to provide learning materials for the school's science clubs and for piloting the design technology program.

The Gifted and Talented Program offered a science club at the elementary schools to provide "hands-on" science experience. Membership was based on interest in science. The meetings were conducted by classroom teachers who volunteered. Teachers were compensated by being awarded science teaching aids for their classrooms. Because the teachers received the materials during the last week of school, their effectiveness cannot be evaluated at this time. According to Elementary Gifted and Talented documents, there were 24 science clubs with 324 students and 12 teachers participating. The meetings were held at each respective school.

The Gifted and Talented programs purchased a Design Technology Kit which was used in conjunction with the pilot testing of the first-grade design technology program. **The design technology program focused on teaching engineering and science skills through hands-on experience.** The program was evaluated by questionnaires developed by the Gifted and Talented program. The questionnaire contained both scaled answers and open-ended questions.

A Design and Technology Curriculum was also developed for kindergarten use to be piloted in the 1991-92 school year.

SECONDARY

Secondary Mathematics

The secondary mathematics workshops concentrated on teaching the use of manipulatives and use of calculators.

The AISD Secondary Mathematics Instructional Coordinator organized six workshops which were all held at AISD schools. Leaders of the workshops were AISD teachers considered effective, knowledgeable, and creative in the teaching of mathematics.

The workshops' objective was to expose teachers to the latest technology and teaching techniques. These workshops focused on the use of manipulatives, the use of graphic and scientific calculators, and the use of videodiscs. Figure 18 lists the Secondary Mathematics workshops.

FIGURE 18
SECONDARY MATHEMATICS WORKSHOPS
SPRING, 1991

TITLE	DATE
Using the Graphic Calculator in Mathematics Instruction	June 3, 1991
Calculator Usage in the Middle School Classroom	June 4, 1991
Calculator Usage in the Senior School Classroom	June 5, 1991
Improved Mathematics Instruction in Middle Schools through Enrichment and Error Analysis	June 6, 1991
Improved Mathematics Instruction in High Schools through Enrichment and Error Analysis	June 7, 1991
Utilization of Videodisc to Support Mathematics Instruction	June 8, 1991

The following materials were purchased with Title II funds:

- 350 simple calculators
- 30 graphic calculators
- 7 scientific calculators

ORE-developed questionnaires were used for the workshop evaluations. Nine close-ended and six open-ended questions constituted the instrument.

Sixteen senior high school teachers attended a graduate course at Southwest Texas State University. Title II funds paid the tuition costs for these teachers. The primary component of the graduate course stressed the appropriate use of manipulatives and technology in the development of problem solving in algebra and geometry. Teachers also received specialized training in IBM computer applications and graphics calculator applications. Enrollment was limited to 24 applicants.

Title II funds were also enlisted to assist 10 junior and senior high school teachers to attend the National Council of Teachers of Mathematics (NCTM). This conference was held in New Orleans, Louisiana from April 17-20, 1991.

ORE-developed questionnaires were used to evaluate both the conference and the graduate course. The questionnaires consisted of six close-ended, scaled questions.

Secondary Science

Secondary Science used Title II funds to offer a staff development workshop in laser disc technology in conjunction with the development of a scope and sequence. The AISD Secondary Science Instructional Coordinator organized and led the workshop and the development of the scope and sequence.

With $16,500 of Title II monies, secondary science purchased 25 video disc libraries; one went to each school.

During the 1990-91 school year, 34 teachers attended the National Science Teachers Association. The conference was held March 29-30, 1991 in Houston, Texas.

Secondary Science developed scopes and sequences for 7th-grade life science and 9th-grade biology. The science scopes and sequences were developed to create a more uniform and streamlined curriculum throughout the District. Correlated with the text books and videodiscs, general course outlines were generated as well as overall goals for each course. The developed scopes and sequences will be implemented in September, 1991.

Austin Independent School District

Department of Management Information
Dr. Glynn Ligon, Executive Director

Office of Research and Evaluation
Systemwide Evaluation
David Wilkinson, Evaluator

Author:
Jeannine Turner, Evaluation Associate

Contributing Staff:
Leonila M. Gonzalez, Secretary

Board of Trustees

Bernice Hart, President
Bob West, Vice President
John Lay, Secretary
Nan Clayton
Dr. Beatriz de la Garza
Melissa Knippa
Dr. Gary R. McKenzie

Superintendent of Schools
Dr. Jim B. Hensley

Publication Number 90.46
June, 1991